DENNY SUBSTATION PROGRAM

Seattle, Washington

APPLICATION

for

MAJOR PUBLIC PROJECT CONSTRUCTION NOISE VARIANCE

Prepared by:

SEATTLE CITY LIGHT

July 29, 2014

CONTENTS

1.0 INTRODUCTION

Seattle City Light (SCL) seeks a Major Public Project Construction Noise Variance (MPPCNV) from the City of Seattle noise limits for construction of the Denny Substation Program in Seattle, Washington. The Variance would pertain to construction occurring within public rights-of-way, which may require nighttime activity in order to avoid disruptions to daytime traffic.

The MPPCNV Application is accompanied by a Noise Management and Mitigation Plan (NMMP) prepared by BRC Acoustics and Audiovisual Design and dated July 29, 2014. A Draft Environmental Impact Statement for the Denny Substation Program was submitted on March 27, 2014.

The Variance Application was prepared according to the requirements of Sections 25.08.590 and 25.08.655 of the Seattle Municipal Code (SMC) and Director's Rule DR3-2009, pertaining to Variances from the City of Seattle Noise Code in general and to Major Public Project Construction Noise Variances in particular. The purpose of the Variance is to allow sound levels from nighttime construction to exceed the noise limits contained in SMC 25.08.410 to 425, which limit nighttime sound levels to 60 dBA (Leq) and 75 dBA (Lmax) at receiving properties zoned Commercial. (Relevant noise descriptors are defined in the NMMP prepared by BRC Acoustics).

The MPPCNV Application presents

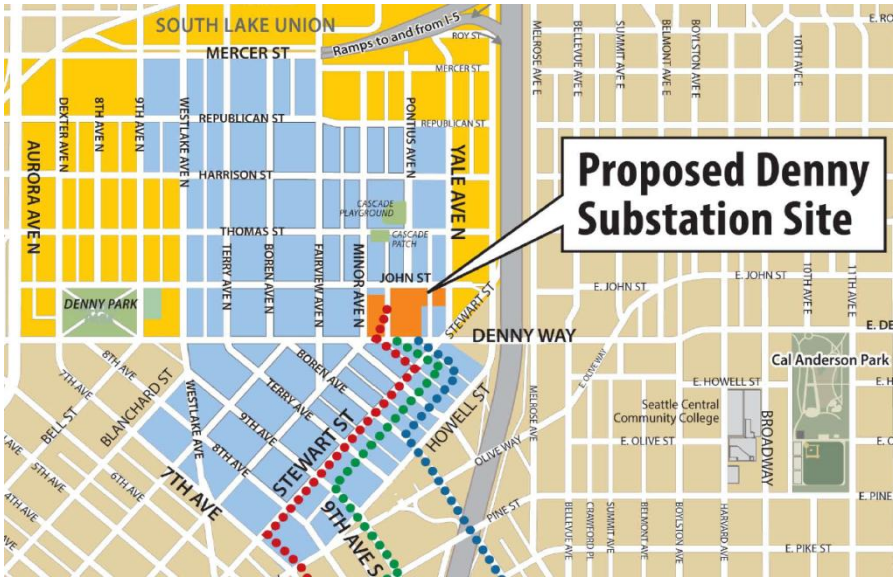
- A description of the Denny Substation Program and proposed construction activities;
- Seattle Municipal Code noise limits that apply in the project areas and from which a Variance is being sought;
- Existing baseline sound levels at noise-sensitive land uses within the project areas;
- Description of the proposed construction activities;
- Calculated sound levels that may be expected at noise-sensitive land uses during nighttime construction activities;
- Proposed noise-mitigation measures;
- Proposed, project-specific sound-level limits for construction activities covered by the MPPCNV;
- Provisions for community outreach and Contractor's provisions for noise control and compliance tracking.

The Variance Application proposes to limit sound levels from construction activities under the Variance to 85 dBA (Lmax), *i.e.*, 10 dBA above the nighttime noise limits contained in SMC 25.08.410. This sound level would be in the range of existing Lmax sound levels measured during the late-night hours of midnight to 5 a.m. at most receiver locations, and would exceed the range of existing Lmax sound levels by up to 6 dBA at some receivers in the Denny Network Phase-1 area. Furthermore, the Variance Application proposes to track compliance with the

terms of the Variance by monitoring the measured hourly L1 sound level and applying the noise limit of 85 dBA.

2.0 THE DENNY SUBSTATION PROGRAM

The Denny Substation Program will be a new electrical substation which will provide 13.8kV electrical underground distribution circuits which extend into the Denny Triangle area and the South Lake Union area to serve new and increasing electrical loads in the area. The substation is located between Denny Way and John Street, and Minor Avenue and the alley west of Yale Avenue. The section of Pontius Avenue within the described area is planned to be vacated to provide adequate space for the substation. The area shown in blue in the Figure below indicates the extent of the electrical distribution circuits and these circuits will be located within the street



right-of-way.

The blue area north of Denny Way is Denny Network Phase 1. The blue area south of Denny Way is Denny Network Phase 2.

For the purposes of this MPPCNV Application, the Denny Substation Program comprises only the following three Projects:

- Denny Substation;
- Denny Network Phase 1;
- Denny Network Phase 2.

All three Projects may involve nighttime construction, and a MPPCNV from the City of Seattle Noise Code is being sought for all three Projects.

2.1 Site Descriptions and Noise-Sensitive Receivers

Aerial photographs of the project areas and noise-sensitive receivers are contained in the NMMP (Figures 2-1 to 2-3 of the NMMP).

Noise-sensitive land uses nearest the Substation project site are listed in Table 2-1. The nearest residential land uses are the Brewster Apartments, located to the west and across Pontius Avenue. Additional apartments are located to the north (across John Street), east (across an alley), and farther to the south (across Stewart Street). The Seattle Cancer Care Alliance House, which provides accommodations for cancer patients and their families, is located to the north. Mirabella Seattle, a retirement community, is located farther to the west, across Minor Avenue North.

The substation site and neighboring properties to the east and west are zoned SM-125 (Seattle Mixed) by the City of Seattle. Properties to the north, across John Street, are zoned SM/R 55/75 (Seattle Mixed Residential).

TABLE 2-1
NOISE-SENSITIVE LAND USES
AREA OF SUBSTATION PROJECT

Location	Address	Zoning
Plymouth Housing David Coldwell Apartments	111 Yale Ave. N.	SM-125
Alley 24 South Tower	224 Pontius Ave. N.	SM/R 55/75
Seattle Cancer Care Alliance House	207 Pontius Ave. N.	SM/R 55/75
Brewster Apartments	133 Pontius Ave. N.	SM-125
Mirabella Seattle	116 Fairview Ave North	SM-125

The noise-sensitive land uses in the Denny Network Phase-1 area are listed in Table 2-2.

Surrounding properties are zoned SM (Seattle Mixed) and SM/R (Seattle Mixed Residential). Both zones are classified as Commercial Districts for the purpose of the Seattle Noise Code.

TABLE 2-2
NOISE-SENSITIVE LAND USES
DENNY NETWORK PHASE-1 AREA

Location	Address	Zoning
Alcyone Apartments	301 Minor Ave. N.	SM/R 55/85
Alley 24 North Building	224 Pontius Ave. N.	SM/R 55/75
AMLI Apts.	535 Pontius Ave. N.	SM/R 55/85
Apartment & Store	502 Minor Ave. N.	SM/R 55/85
Apartment Building	215 Pontius Ave. N.	SM/R 55/85
Apartment Building	219 Pontius Ave. N.	SM/R 55/85
Casa Pacifica Apts.	1167 Republican St.	SM/R 55/85
Cascade Supportive Housing Apartments	424 Minor Ave. N.	SM/R 55/85
Day Care	214 Minor Ave. N.	SM/R 55/85
Lakeview Apts.	1170 Harrison St.	SM/R 55/85
Stack House Apartments	420 Pontius Ave. N.	SM/R 55/85
Veer Lofts Condominium	401 9th Avenue N.	SM 160/85-240

The noise-sensitive land uses in the Denny Network Phase-2 area are listed in Table 2-3.

Surrounding properties are zoned DMC (Downtown Mixed Commercial) or DOC (Downtown Office Core). Both zones are classified as Commercial Districts for the purpose of the Seattle Noise Code.

TABLE 2-3 NOISE-SENSITIVE LAND USES DENNY NETWORK PHASE-2 AREA		
Location	**Address**	**Zoning**
Metropolitan Towers	1942 Westlake Ave.	DOC2 500/300-500
Cosmopolitan Condominium	819 Virginia St.	DMC 240/290-400
Via[6] Apts.	2105 6th Ave.	DOC2 500/300-500
Balfour Apts.	1820 Minor Ave.	DMC 240/290-400
Aspira Apts.	1823 Terry Avenue	DMC 340/290-400
Williamsburg Apts.	1007 Stewart St.	DMC 340/290-400
Harbor House	1930 Boren Ave.	DMC 240/290-400
Stewart Court Apts.	1831 8th Ave.	DOC 2 500/300-500
Hotel Max	620 Stewart St.	DOC 2 500/300-500
Westin Hotel	1900 5th Ave.	DOC 2 500/300-500
Julie Apartments	1932 9th Ave.	DMC 340/290-400
Westlake Hotel	2008 Westlake Ave.	DOC 2 500/300-500
Larned Apts.	2030 7th Ave.	DOC 2 500/300-500

2.2 Proposed Nighttime Construction

Seattle City Light is seeking the MPPCNV primarily for construction activities occurring within public rights-of-way, which may need to be scheduled for the nighttime hours of 10 p.m. to 7 a.m. on weekdays and 10 p.m. to 9 a.m. on weekends or Holidays, in order to minimize disruption to daytime traffic.

The estimated task durations provided below are based on the project scheduler's interpretation of effort. The actual task durations will be determined by the Contractor.

Tasks that may require nighttime operation are listed below.

Substation

- Street-utility relocation (estimated 25 days);
- Off-site ductbanks (estimated 125 days);
- Asphalt paving on City streets (estimated 45 days);
- Delivery of Major Equipment (estimated to be completed in one night).

Denny Network Phase 1

- Sawcutting/breaking concrete, pavement removal;

- Excavation, duct-bank installation, encasement/backfill, and vault installation;
- Surface restoration.

It is anticipated that a given city block would be under construction over an estimated 40-day period and several blocks could be active simultaneously. Construction activities would be concentrated at vault areas for periods of 18 days. Concentrations of activity would also occur during rebuilding of interchanges, for periods of 15 days, and at track crossings on Terry Ave. N. at Harrison and Thomas Streets, for periods of 12 to 20 days.

Denny Network Phase 2

- Sawcutting/breaking concrete, pavement removal;
- Excavation, duct-bank installation, encasement/backfill, and vault installation;
- Surface restoration.

It is anticipated that a given city block would be under construction over an estimated 48- to 60-day period and several blocks could be active simultaneously. Construction activities would be concentrated at vault areas for periods of 18 to 30 days.

3.0 CITY OF SEATTLE CRITERIA FOR A MAJOR PUBLIC PROJECT CONSTRUCTION NOISE VARIANCE

The City of Seattle criteria for a Noise Variance are contained in SMC 25.08.590 and SMC 25.08.655, with further details and explanatory statements contained in Department of Planning and Development (DPD) Director's Rule 3-2009.

3.1 Seattle Municipal Code Section 25.08.590

City of Seattle criteria for granting a Noise Variance in general are contained in SMC Section 25.08.590, *Granting of Variance.* The provisions of SMC 25.08.590 and their application to the Denny Substation MPPCNV Application are discussed in the following paragraphs.

25.08.590 C:
The Administrator may grant a variance if the Administrator finds that:

1. *The noise occurring or proposed to occur does not endanger public health or safety; and*
2. *The applicant demonstrates that the criteria required for the variance are met.*

The results presented in Section 7.0 of the project NMMP show that sound levels from proposed nighttime activities are expected to exceed the nighttime noise limits of 60 dBA (Leq) and 75 dBA (Lmax) that apply to source and receiver properties in Commercial zones.

The proposed sound-level limit for nighttime activities within the purview of the Variance is an hourly Lmax of 85 dBA. The proposed limit falls within the range of Lmax sound levels measured during the quietest hours of midnight to 5 a.m. in the Substation and Denny Network Phase-2 areas, and exceed the sound levels during the quietest hours by up to 6 dBA in the Denny Network Phase-1 area.

The proposed Variance noise limits coincide with the limits approved in the DPD Decision and Order for the Mercer Corridor Improvements, where it was noted that they would not exceed the City of Seattle nighttime noise limits by more than 10 dBA and would not endanger public health or safety, although they may cause occasional sleep disruption as construction occurs in the immediate vicinity of a given residential receiver.

In evaluating the potential for impacts on health and safety, it may be noted that the proposed variance limits on the hourly Lmax (*i.e.*, on the highest sound level expected in one hour) coincide with the daytime limit on the construction Leq (*i.e.*, on the continuous energy-average sound level). Accordingly, the Variance noise limit is a considerably more stringent restriction than the City of Seattle daytime noise limit for construction noise.

Furthermore, the Variance noise limit on the instantaneous Lmax is significantly lower than the Occupational Safety and Health Act (OSHA) limit of 90 dBA for hearing damage <u>at continuous exposure over a work day</u>.

The proposed Variance noise limits pertain to non-impact construction equipment only. No nighttime use of impact-type equipment is proposed for construction of the Denny Substation projects.

As discussed in Section 4.1.4, sound levels from construction are expected to meet the proposed Variance noise limits with the noise-mitigation measures listed in Section 4.2.

25.08.590 D. Noise Management and Mitigation Plan:
As part of the application for a variance, an applicant must submit a Noise Management and Mitigation Plan to be approved by the Administrator.

The Noise Management and Mitigation Plan prepared by BRC Acoustics on July 29, 2014 is submitted simultaneously with this Application for a MPPCNV. Section 4.0 of this Application addresses the requirements of SMC 25.08.590D.1 to 4 and the corresponding findings of the NMMP.

3.2 Seattle Municipal Code Section 25.08.655

City of Seattle criteria for granting a Major Public Project Construction Noise Variance are contained in SMC Section 25.08.655, *Major Public Project Construction Variance.*

A "major public project" is defined in Section 25.08.168 as
a project for a public facility as defined in SMC Title 23, the construction of which the Administrator determines is likely to be of at least six months duration, and is likely to have a substantial impact on the public safety, health and welfare and the provision of public services, including transportation services. In making this determination the Administrator shall consider factors such as the expected size, complexity or cost of the proposed construction or reconstruction; the expected duration of the proposed construction or reconstruction; the magnitude of the expected impacts on traffic and transportation; and/or the degree of impact on the provision of public services during the proposed construction or reconstruction.

The Denny Substation and Denny Network Phase 1 and Phase 2 qualify as a "public facility", which is defined in SMC Title 23 as "a public project or city facility". The factors discussed below describe the aspects of the construction project that make it eligible for a Major Public Project Noise Variance.

- Once constructed, the Denny Program will have several benefits to the area:
    - Presently, Broad Street Substation is essentially at capacity during peak load. The construction of Denny Program will shift electrical load to Denny Substation. This off-loading will provide better flexibility in operation and maintenance of Broad Street Substation.
    - Recent proposed building-height restrictions have been raised from 200 feet to 400 feet causing the electrical load density to potentially increase to double. Another substation is needed to serve the additional future loads through the upcoming years. Denny Program meets those needs.
    - Denny Program will comprise state-of-the-art equipment and design. The station control buildings will meet LEED certification standards, exhibit sustainability features, and the new equipment will be highly reliable.
    - Distribution circuits exiting the station are of network design, which is the highest reliability configuration which is necessary for data centers and high tech companies like Amazon.
    - The architectural exterior, walkways and park area will draw the public to the new facility. Viewing windows on the walkways will allow the public to be safely educated on substation operation and equipment.

- Since the substation is located in a very urban area, special design features are being implemented:

  - All transmission and distribution circuits are being placed underground to prevent unsightly congestion of overhead lines.
  - The perimeter of the substation wall will be of architectural nature so as to blend in with the urban environment and to allow the substation to be somewhat hidden.
  - Since Pontius Avenue is being vacated, the design will include a park area with landscaping for public benefit.
  - All of the substation equipment is of compact to design so as to minimize the required area and height of the substation layout.
  - Art is being incorporated into the project.
  - An existing transmission line will be bisected to provide two initial sources of power to the station at 115kV from Broad Street Substation and East Pine Substation. The ultimate build-out of the station will include 13.8kV, 26kV, 115kV and 230kV.

- The project construction period is estimated to be approximately 24 months. Combined cost of the project is $210M.

- Construction of the Denny Substation and Denny Network Phases 1 and 2 will require extensive construction activity on or across several Principal Arterials (Denny Way, Stewart Street, Fairview Avenue, Westlake Avenue, 9th Avenue, and 6th Avenue) and Minor Arterials (Virginia Street, Lenora Street, 7th Avenue, Republican Street). Such activities could require partial or full closure of these streets. Allowing some construction to occur at night would lessen the adverse effect to traffic and bus routes along these arterials.

SMC 25.08.655A states the criteria for granting a MPPCNV as follows:

The Administrator may grant a major public project construction variance to provide relief from the exterior sound level limits established by this chapter during the construction periods of major public projects. A major public project construction variance shall provide relief from the exterior sound level limits during the construction or reconstruction of a major public project only to the extent the applicant demonstrates that compliance with the levels would:

1. *Be unreasonable in light of public or worker safety or cause the applicant to violate other applicable regulations, including but not limited to regulations that reduce impacts on transportation infrastructure or natural resources; or*
2. *Render the project economically or functionally unreasonable due to factors such as the financial cost of compliance or the impact of complying for the duration of the construction or reconstruction of the major public project.*

- As previously described, construction of the Denny Substation and Denny Network Phases 1 and 2 will require extensive construction activity on or across several Principal Arterials (Denny Way, Stewart Street, Fairview Avenue, Westlake Avenue, 9th Avenue, and 6th Avenue) and Minor Arterials (Virginia Street, Lenora Street, 7th Avenue,

Republican Street). Construction that affects arterials will not be allowed during the commuter peak periods from 6:00 A.M. to 9:00 A.M. and from 3:00 P.M. to 6:00 P.M., leaving a small window of consecutive daylight hours when construction could occur. While midday traffic is usually lower than during the peaks, lane closures required for trenching could still create severe congestion and affect bus route reliability. Allowing some construction to occur at night would lessen the adverse effect to traffic and bus routes along these arterials.

- Members of the public have expressed concern about past and ongoing construction in the vicinity of this project, along with their opinions that the project will potentially increase those impacts. City Light continues to work with the public, as well as with city departments regarding other public projects, to identify opportunities to reduce traffic impacts. One method for reducing overall impacts could be to work at night in some locations, which are yet to be determined.

SMC 25.08.655 B states the terms of a Variance as follows:

A major public project construction variance shall set forth the period or periods during which the variance is effective, which period or periods shall be the minimum reasonably necessary in light of the standards set forth in subsection A, and the exterior sound level limits that will be in effect during the period of the variance.

The MPPCNV is requested for the duration of construction in the Denny Network Phase-1 and Phase-2 areas and in public rights-of-way in the vicinity of the Substation site. The duration is estimated by the project scheduler as 24 months.

The proposed limit for sound levels received at the exterior of noise-sensitive properties during activities covered by the NMMP is 85 dBA (hourly Lmax). Compliance with the terms of the Variance is to be verified by applying the limit of 85 dBA to the measured hourly L1 reported by the Independent Noise Monitor.

4.0 THE NOISE MANAGEMENT AND MITIGATION PLAN

Section 25.08.590 D of the Seattle Municipal Code lists the components generally required in a Noise Management and Mitigation Plan. The following sections of this Application discuss the requirements and the NMMP prepared by BRC Acoustics on July 29, 2014.

4.1 SMC 25.08.590 D.1

A description of the exterior sound level limits of the chapter expected to be exceeded, estimates of the amount(s) by which these levels are expected to be exceeded and by what equipment, the exterior sound level limits that will be in effect during the variance, the time periods during which the pre-variance exterior sound level limits may be exceeded, and the expected sources of sound during each of the time periods (e.g., types of equipment or activity causing the exterior sound level limits to be exceeded).

4.1.1 Limits on Exterior Sound Levels

The applicable City of Seattle noise limits are contained in Chapter 25.08, *Noise Control*, of the Seattle Municipal Code. Exterior noise limits are contained in Section 25.08.410 to 425, and are based on the zoning of source and receiver properties. The Denny Substation property and properties surrounding the site and lining the Denny Network areas are zoned Commercial.

Sound produced by construction or maintenance equipment may exceed the established exterior sound level limits of Sections 25.08.410 to 420 during daytime hours by specified amounts depending on the type of equipment. For equipment used on a major public project, the allowable increases for construction noise sources apply during the hours of 7 a.m. to 10 p.m. on weekdays and 9 a.m. to 10 p.m. on weekends and legal Holidays. The noise limits apply to sound levels as measured from the property line of the real property of another person or at a distance of 50 feet from the construction or maintenance equipment making the sound, whichever distance is greater. The noise limits may be exceeded by 25 dBA for equipment on construction sites, including but not limited to crawlers, tractors, dozers, rotary drills, augers, loaders, power shovels, cranes, derricks, graders, off-highway trucks, ditchers, trenchers, compactors, compressors, and pneumatic-powered equipment;

The exterior noise limits for construction noise sources located on commercial property and commercial receiver properties, as resulting from SMC 25.08.410 to 425, are presented in Table 4-1. The daytime noise limits apply at the nearest noise-sensitive property line or 50 feet from the construction equipment, whichever *distance* is greater. The nighttime noise limits apply at the nearest noise-sensitive property line or at any point on the façade of a noise-sensitive receiver building, whichever *level* is greater.

TABLE 4-1
CITY OF SEATTLE EXTERIOR SOUND LEVEL LIMITS FOR CONSTRUCTION COMMERCIAL SOURCE PROPERTIES (dBA)

Receiver Property	Daytime[1]		Nighttime[2]	
	Leq	Lmax (Fast)	Leq	Lmax (Fast)
Commercial	85	100	60	75

[1]Daytime is defined as 7 a.m. to 10 p.m. on weekdays and 9 a.m. to 10 p.m. on weekends and legal Holidays;
[2]Nighttime is defined as 10 p.m. to 7 a.m. on weekdays and 10 p.m. to 9 p.m. on weekends and legal Holidays

In addition, sound created by impact types of equipment, including but not limited to pavement breakers, hoe rams, pile drivers, jackhammers, sandblasting tools, or by other types of equipment that create impulse sound or impact sound or are used as impact equipment, as measured at the property line or 50 feet from the equipment, whichever distance is greater, may exceed the established exterior sound level limits in any one hour period between the hours of 8 a.m. and 5 p.m. on weekdays and 9 a.m. and 5 p.m. on weekends and legal holidays, but in no event may the sound level exceed the following:

- Leq 90 dB(A) continuously;
- Leq 93 dB(A) for 30 minutes;
- Leq 96 dB(A) for 15 minutes; or
- Leq 99 dB(A) for 7-1/2 minutes.

Sound levels over Leq 99 dB(A) are prohibited unless authorized by variance obtained from the City of Seattle.

Impact noise sources such as hoe rams and jackhammers would be used only during the daytime on the Denny Substation projects, and are expected to meet the City of Seattle daytime noise limits with noise mitigation.

4.1.2 Existing Baseline Sound Levels

BRC Acoustics conducted continuous monitoring of A-weighted sound levels ranging in duration from one to four days at locations selected among the noise-sensitive land uses listed in Tables 2-1, 2-2, and 2-3. The sound monitoring in the Denny Substation area took place in September and October 2012, and the sound monitoring in the Denny Network Phase-1 and Phase-2 areas took place between April and June 2014.

Tables 4-2 to 4-4 list the noise-monitoring locations and resulting baseline sound levels in the form of hourly Leq and hourly Lmax. The baseline sound levels are summarized as energy-average Leq and range of hourly Lmax over three periods of the day:

- Daytime hours (7 a.m. to 10 p.m.);
- Nighttime hours (10 p.m. to 7 a.m.);
- Late-night hours (midnight to 5 a.m.).

Sound levels measured during the third category, late-night hours, provide the most conservative representation of existing, baseline conditions. The tables also show the noise limits that would apply to construction activities during the three time periods, in the absence of a Noise Variance.

TABLE 4-2
EXISTING BASELINE SOUND LEVELS
SUBSTATION LOCATIONS
Leq (Range of hourly Lmax), dBA

Location #	Daytime	Nighttime	Late-Night
Coldwell (Terrace)	65 (76-99)	63 (70-97)	62 (70-93)
Coldwell (Roof)	67 (72-89)	66 (68-91)	65 (68-87)
Alley 24[2]	66 (65-92)	62 (70-80)	61 (70-78)
SCCA	66 (72-95)	63 (66-83)	61 (66-74)
Brewster[2]	64 (76-95)	64 (68-82)	63 (68-82)
Mirabella #819	67 (73-95)	65 (68-91)	65 (68-81)
Mirabella #523	67 (76-99)	65 (72-94)	64 (72-82)
Noise Limit	**85 (100)**	**60 (75)**	**60 (75)**

Notes:
[2]*Continuous monitoring on weekdays only.*

The measured nighttime sound levels exceed the City of Seattle noise limits of 60 dBA (Leq) and 75 dBA (Lmax) at all monitoring locations in the Substation area.

TABLE 4-3
EXISTING BASELINE SOUND LEVELS
DENNY NETWORK PHASE-1 LOCATIONS
Leq (Range of hourly Lmax), dBA

Location #	Daytime	Nighttime	Late-Night
Stack House	59 (65-88)	57 (61-77)	56 (61-73)
Casa Pacifica	63 (70-93)	61 (62-79)	60 (62-79)
Cascade Playground	63 (69-99)	56 (59-79)	54 (59-79)
Noise Limit	**85 (100)**	**60 (75)**	**60 (75)**

The Leq sound levels measured during the late-night hours of midnight to 5 a.m. meet the City of Seattle noise limits of 60 dBA at all monitoring locations in the Denny Network Phase-1 area. The Lmax sound levels measured during the late-night hours of midnight to 5 a.m. meet the City

of Seattle noise limit of 75 dBA at the Stack House Apartments and exceed the nighttime noise limits at Casa Pacifica Apartments and the Cascade Playground.

TABLE 4-4
EXISTING BASELINE SOUND LEVELS
DENNY NETWORK PHASE-2 LOCATIONS
Leq (Range of hourly Lmax), dBA

Location #	Daytime	Nighttime	Late-Night
Metro Towers[2]	70 (74-97)	63 (68-98)	59 (68-83)
Via[6]	70 (74-101)	59 (66-88)	56 (66-84)
Harbor House	65 (71-101)	63 (66-97)	62 (66-97)
Stewart Court	64 (73-98)	61 (69-97)	59 (69-95)
Cosmopolitan	65 (67-98)	64 (67-96)	65 (71-88)
Aspira	69 (75-104)	66 (70-97)	64 (70-97)
Noise Limit	**85 (100)**	**60 (75)**	**60 (75)**

Notes:
[2]*Continuous monitoring on weekdays only.*

The measured nighttime Leq sound levels exceed the City of Seattle noise limits of 60 dBA at all monitoring locations in the Denny Network Phase-2 area during most nighttime hours. The measured nighttime Lmax sound levels exceed the City of Seattle noise limits of 75 dBA at all monitoring locations in the Denny Network Phase-2 area during all nighttime hours.

4.1.3 Estimated Exceedances over the Noise Limits, Equipment Producing Exceedances, and Time Periods of Exceedances

BRC Acoustics prepared a model to calculate sound levels produced by construction activities and received at noise-sensitive buildings in the project area.

The equipment that may be used throughout construction of the Denny Substation projects is listed in Table 4-5 below. The table also indicates which equipment is expected to operate at night.

TABLE 4-5
CONSTRUCTION EQUIPMENT FOR DENNY SUBSTATION PROGRAM

Equipment	Daytime/Nighttime Operation
Hoe ram (concrete breaker)	Daytime only
Jackhammer	Daytime only
Concrete Saw	Daytime and Nighttime
Auger Drill	Daytime and Nighttime
Excavator	Daytime and Nighttime
Roller	Daytime and Nighttime
Concrete mixer	Daytime and Nighttime
Mobile Crane	Daytime and Nighttime
Dozer	Daytime and Nighttime
Paver	Daytime and Nighttime
Backhoe	Daytime and Nighttime
Haul Truck	Daytime and Nighttime
Pavement Scarifier	Daytime and Nighttime
Vacuum Truck	Daytime and Nighttime

The following paragraphs describe construction activities that may take place at night in order to minimize traffic disruptions during the daytime. Sound levels during these activities are expected to exceed the (non-variance) City of Seattle nighttime noise limits listed in Table 4-1. The estimated durations of the exceedances over the noise limits are also indicated. The sound levels listed in this section are without additional noise mitigation. Noise mitigation measures are discussed in Section 4.2.

Substation Project

- Street-utility relocation (estimated 25 days):

  Resulting sound levels are shown in Table 4-6.

TABLE 4-6
CALCULATED SOUND LEVELS, HOURLY Leq (Lmax), dBA
SUBSTATION PROJECT
STREET UTILITY RELOCATION

Receiver Property	Existing Ambient		Calculated		SMC Noise Limit	
	Day	Late Night	Day	Night	Day	Night
Coldwell Apartments	65 (76-99)	62 (70-93)	71 (72)	68 (69)	85 (100)	60 (75)
Alley 24 South Tower	66 (65-92)	61 (70-78)	**88**[1] (93)	85 (**88**[2])	85 (100)	60 (75)
SCCA	66 (72-95)	61 (66-74)	84 (89)	83 (**89**[2])	85 (100)	60 (75)
Brewster Apartments	64 (76-95)	63 (68-82)	**91**[1] (92)	88 (**91**[2])	85 (100)	60 (75)
Mirabella	67 (76-99)	64 (72-82)	**86**[1] (92)	84 (**89**[2])	85 (100)	60 (75)

[1]*Sound levels without mitigation exceed City of Seattle daytime noise limits.*
[2]*Sound levels without mitigation exceed proposed Variance Noise Limits.*

- Off-site ductbanks (estimated 125 days):

  Resulting sound levels are shown in Table 4-7.

TABLE 4-7
CALCULATED SOUND LEVELS, HOURLY Leq (Lmax), dBA
SUBSTATION PROJECT
OFF-SITE DUCTBANKS

Receiver Property	Existing Ambient		Calculated		SMC Noise Limit	
	Day	Late Night	Day	Night	Day	Night
Coldwell Apartments	65 (76-99)	62 (70-93)	82 (89)	82 (**89**[2])	85 (100)	60 (75)
Alley 24 South Tower	66 (65-92)	61 (70-78)	65 (67)	65 (67)	85 (100)	60 (75)
SCCA	66 (72-95)	61 (66-74)	71 (71)	71 (71)	85 (100)	60 (75)
Brewster Apartments	64 (76-95)	63 (68-82)	76 (83)	76 (83)	85 (100)	60 (75)
Mirabella	67 (76-99)	64 (72-82)	72 (74)	72 (74)	85 (100)	60 (75)

[2]*Sound levels without mitigation exceed the proposed Variance Noise Limits*

- Asphalt paving on City Streets (estimated 45 days):

  Resulting sound levels are shown in Table 4-8.

TABLE 4-8
CALCULATED SOUND LEVELS, HOURLY Leq (Lmax), dBA
SUBSTATION PROJECT
ASPHALT PAVING ON CITY STREETS

Receiver Property	Existing Ambient		Calculated		SMC Noise Limit	
	Day	Late Night	Day	Night	Day	Night
Coldwell Apartments	65 (76-99)	62 (70-93)	69 (70)	69 (70)	85 (100)	60 (75)
Alley 24 South Tower	66 (65-92)	61 (70-78)	85 (88)	85 (**88**[2])	85 (100)	60 (75)
SCCA	66 (72-95)	61 (66-74)	84 (87)	84 (**87**[2])	85 (100)	60 (75)
Brewster Apartments	64 (76-95)	63 (68-82)	73 (74)	73 (74)	85 (100)	60 (75)
Mirabella	67 (76-99)	64 (72-82)	**86**[1] (87)	86 (**87**[2])	85 (100)	60 (75)

[1]*Sound levels exceed City of Seattle daytime noise limits.*
[2]*Sound levels exceed proposed Variance Noise Limits.*

- Delivery of Major Equipment (estimated to be completed in one night)

  Resulting sound levels are shown in Table 4-9.

TABLE 4-9
CALCULATED SOUND LEVELS, HOURLY Leq (Lmax), dBA
SUBSTATION PROJECT
DELIVERY OF MAJOR EQUIPMENT

Receiver Property	Existing Ambient		Calculated		SMC Noise Limit	
	Day	Late Night	Day	Night	Day	Night
Coldwell Apartments	65 (76-99)	62 (70-93)	64 (67)	64 (67)	85 (100)	60 (75)
Alley 24 South Tower	66 (65-92)	61 (70-78)	63 (66)	63 (66)	85 (100)	60 (75)
SCCA	66 (72-95)	61 (66-74)	63 (69)	63 (69)	85 (100)	60 (75)
Brewster Apartments	64 (76-95)	63 (68-82)	66 (72)	66 (72)	85 (100)	60 (75)
Mirabella	67 (76-99)	64 (72-82)	61 (68)	61 (68)	85 (100)	60 (75)

The calculated sound levels from most construction activities in the Denny Substation Project exceed the City of Seattle nighttime noise limits. In the worst case of street utility relocation, asphalt paving, and installation of off-site ductbanks in the immediate vicinity of nearby receivers, the exceedances are up to 28 dBA (Leq) and 16 dBA (Lmax) without mitigation. The primary sources of the nighttime exceedances are concrete saw-cutter, milling-machine, dump-truck, and concrete-mixer operations when equipment is located within 25 feet of nearby buildings. Noise mitigation measures are listed in Section 4.2.

Denny Network Phase 1 and Phase 2

Duct-bank construction for the Denny Network Projects consists of three main tasks:

- Task 1 – Sawcutting/breaking concrete, pavement removal;
- Task 2 – Excavation, duct-bank installation, encasement/backfill, and vault installation;
- Task 3 – Surface restoration.

In the Denny Network Phase-1 area, it is anticipated that a given city block would be under construction over an estimated 40-day period and several blocks could be active simultaneously. Construction activities would be concentrated at vault areas for periods of 18 days. Concentrations of activity would also occur during rebuilding of interchanges, for periods of 15 days, and at track crossings on Terry Ave. N. at Harrison and Thomas Streets, for periods of 12 to 20 days.

In the Denny Network Phase-2 area, it is anticipated that a given city block would be under construction over an estimated 48- to 60-day period and several blocks could be active simultaneously. Construction activities would be concentrated at vault areas for periods of 18 to 30 days.

Predicted sound levels from daytime and nighttime activities in the Denny Network Phase-1 area are listed in Tables 4-10 to 4-12.

TABLE 4-10
CALCULATED SOUND LEVELS, HOURLY Leq (Lmax), dBA
DENNY NETWORK PHASE 1
TASK 1 – SAWCUTTING, PAVEMENT REMOVAL

Receiver Property	Existing Ambient		Calculated		SMC Noise Limit	
	Day	Late Night	Day	Night	Day	Night
Alcyone Apartments	63 (69-99)[1]	54 (59-79)[1]	84 (86)	82 (**86**[3])	85 (100)	60 (75)
Alley 24 North Tower	66 (65-92)[1]	61 (70-78)[1]	84 (88)	82 (83[4])	85 (100)	60 (75)
AMLI Apartments	59 (65-88)[1]	56 (61-73)[1]	**86**[2] (87)	85 (**86**[3,4])	85 (100)	60 (75)
215 Pontius Ave. Apts.	66 (72-95)[1]	61 (66-74)[1]	77 (81)	74 (75)	85 (100)	60 (75)
219 Pontius Ave. Apts.	66 (72-95)[1]	61 (66-74)[1]	**89**[2,4] (96)	83 (85[4])	85 (100)	60 (75)
502 Minor Ave. Apts.	63 (70-93)[1]	60 (62-79)[1]	84 (85)	83 (84)	85 (100)	60 (75)
Casa Pacifica Apts.	63 (70-93)	60 (62-79)	**90**[2] (93)	89 (**90**[3])	85 (100)	60 (75)
Cascade Housing Apts.	63 (70-93)[1]	60 (62-79)[1]	78 (81)	75 (76)	85 (100)	60 (75)
Cascade Playground	63 (69-99)	54 (59-79)	73 (74)	72 (73)	85 (100)	60 (75)
Daycare	66 (72-95)[1]	61 (66-74)[1]	74 (75)	73 (74)	85 (100)	60 (75)
Lakeview Apts.	63 (70-93)[1]	60 (62-79)[1]	**88**[2,4] (89)	87 (**88**[3,4])	85 (100)	60 (75)
Stack House Apts.	59 (65-88)	56 (61-73)	**89**[2,4] (91)	87 (**91**[3,4])	85 (100)	60 (75)
Veer Lofts Condo	--	--	84[4] (85)	83 (85[4])	85 (100)	60 (75)

[1]*Extrapolated from measured ambient levels at the nearest property.*
[2]*Sound levels without mitigation exceed City of Seattle daytime noise limits.*
[3]*Sound levels without mitigation exceed proposed Variance Noise Limits.*
[4]*Vacuum Truck without mitigation exceeds limit for sources with pure-tone component (80 dBA).*

TABLE 4-11
CALCULATED SOUND LEVELS, HOURLY Leq (Lmax), dBA
DENNY NETWORK PHASE 1
TASK 2 – EXCAVATION, DUCT-BANK INSTALLATION

Receiver Property	Existing Ambient		Calculated		SMC Noise Limit	
	Day	Late Night	Day	Night	Day	Night
Alcyone Apartments	63 (69-99)[1]	54 (59-79)[1]	82 (83)	81 (82)	85 (100)	60 (75)
Alley 24 North Tower	66 (65-92)[1]	61 (70-78)[1]	81 (82)	80 (81)	85 (100)	60 (75)
AMLI Apartments	59 (65-88)[1]	56 (61-73)[1]	84 (85)	84 (85)	85 (100)	60 (75)
215 Pontius Ave. Apts.	66 (72-95)[1]	61 (66-74)[1]	65 (66)	65 (66)	85 (100)	60 (75)
219 Pontius Ave. Apts.	66 (72-95)[1]	61 (66-74)[1]	79 (80)	78 (79)	85 (100)	60 (75)
502 Minor Ave. Apts.	63 (70-93)[1]	60 (62-79)[1]	83 (84)	82 (83)	85 (100)	60 (75)
Casa Pacifica Apts.	63 (70-93)	60 (62-79)	**90**[2] (91)	90 (**91**[3])	85 (100)	60 (75)
Cascade Housing Apts.	63 (70-93)[1]	60 (62-79)[1]	78 (79)	78 (79)	85 (100)	60 (75)
Cascade Playground	63 (69-99)	54 (59-79)	72 (73)	71 (72)	85 (100)	60 (75)
Daycare	66 (72-95)[1]	61 (66-74)[1]	74 (75)	73 (74)	85 (100)	60 (75)
Lakeview Apts.	63 (70-93)[1]	60 (62-79)[1]	85 (86)	85 (**86**[3])	85 (100)	60 (75)
Stack House Apts.	59 (65-88)	56 (61-73)	**87**[2] (88)	87 (**88**[3])	85 (100)	60 (75)
Veer Lofts Condo	--	--	80 (81)	80 (81)	85 (100)	60 (75)

[1]*Extrapolated from measured ambient levels at the nearest property.*
[2]*Sound levels without mitigation exceed City of Seattle daytime noise limits.*
[3]*Sound levels without mitigation exceed proposed Variance Noise Limits.*

TABLE 4-12
CALCULATED SOUND LEVELS, HOURLY Leq (Lmax), dBA
DENNY NETWORK PHASE 1
TASK 3 – SURFACE RESTORATION

Receiver Property	Existing Ambient		Calculated		SMC Noise Limit	
	Day	Late Night	Day	Night	Day	Night
Alcyone Apartments	63 (69-99)[1]	54 (59-79)[1]	81 (82)	81 (82)	85 (100)	60 (75)
Alley 24 North Tower	66 (65-92)[1]	61 (70-78)[1]	81 (82)	81 (82)	85 (100)	60 (75)
AMLI Apartments	59 (65-88)[1]	56 (61-73)[1]	84 (85)	84 (85)	85 (100)	60 (75)
215 Pontius Ave. Apts.	66 (72-95)[1]	61 (66-74)[1]	64 (65)	64 (65)	85 (100)	60 (75)
219 Pontius Ave. Apts.	66 (72-95)[1]	61 (66-74)[1]	78 (79)	78 (79)	85 (100)	60 (75)
502 Minor Ave. Apts.	63 (70-93)[1]	60 (62-79)[1]	83 (84)	83 (84)	85 (100)	60 (75)
Casa Pacifica Apts.	63 (70-93)	60 (62-79)	**88**[2] (90)	88 (**90**[3])	85 (100)	60 (75)
Cascade Housing Apts.	63 (70-93)[1]	60 (62-79)[1]	78 (79)	78 (79)	85 (100)	60 (75)
Cascade Playground	63 (69-99)	54 (59-79)	73 (74)	73 (74)	85 (100)	60 (75)
Daycare	66 (72-95)[1]	61 (66-74)[1]	73 (74)	73 (74)	85 (100)	60 (75)
Lakeview Apts.	63 (70-93)[1]	60 (62-79)[1]	85 (86)	85 (**86**[3])	85 (100)	60 (75)
Stack House Apts.	59 (65-88)	56 (61-73)	**88**[2] (89)	88 (**89**[3])	85 (100)	60 (75)
Veer Lofts Condo	--	--	79 (81)	79 (81)	85 (100)	60 (75)

[1]*Extrapolated from measured ambient levels at the nearest property.*
[2]*Sound levels without mitigation exceed City of Seattle daytime noise limits.*
[3]*Sound levels without mitigation exceed proposed Variance Noise Limits.*

The calculated sound levels from most construction activities exceed the City of Seattle nighttime noise limits. In the worst case of equipment located in the immediate vicinity of the AMLI, Casa Pacifica, Lakeview, Alcyone, and Stack House Apartments, the exceedances are up to 30 dBA (Leq) and 16 dBA (Lmax) without mitigation. The noise sources primarily responsible for the nighttime Lmax exceedances are the concrete saw cutter and milling machine in Task 1, crane, dump trucks, mixer, and excavator in Task 2, and dump truck, roller, paver, and concrete mixer in Task 3, when located within 25 feet of affected buildings. Noise mitigation measures are listed in Section 4.2.

Predicted sound levels from daytime and nighttime activities in the Denny Network Phase-2 areas are listed in Tables 4-13 to 4-15.

TABLE 4-13
CALCULATED SOUND LEVELS, HOURLY Leq (Lmax), dBA
DENNY NETWORK PHASE 2
TASK 1 – SAWCUTTING, PAVEMENT REMOVAL

Receiver Property	Existing Ambient		Calculated		SMC Noise Limit	
	Day	Late Night	Day	Night	Day	Night
Cosmopolitan Condo	65 (67-98)	65 (71-88)	84 (85)	83 (85[5])	85 (100)	60 (75)
Via[6] Apartments	70 (74-101)	56 (66-84)	**89**[2] (92)	86 (**92**[3])	85 (100)	630 (75)
Balfour Apartments	65 (71-101)[1]	62 (66-97)[1]	84 (87)	81 (82)	85 (100)	60 (75)
Williamsburg Apts.	69 (75-104)[1]	66 (70-97)[1]	84 (89)	82 (83)	85 (100)	60 (75)
Aspira Apartments	69 (75-104)	66 (70-97)	81 (85)	80 (85)	85 (100)	60 (75)
Harbor House	65 (71-101)	62 (66-97)	82 (85)	79 (82)	85 (100)	60 (75)
Stewart Court	64 (73-98)	59 (69-95)	81 (83)	79 (80)	85 (100)	60 (75)
Hotel Max	64 (73-98)[1]	59 (69-95)[1]	81 (83)	80 (83[5])	85 (100)	60 (75)
Metropolitan Towers[4]	70 (74-97)	59 (68-83)	79 (80)	77 (78)	85 (100)	60 (75)
Westin Hotel North Tower	70 (74-101)[1]	56 (66-84)[1]	77 (79)	75 (76)	85 (100)	60 (75)
Westin Hotel South Tower	70 (74-101)[1]	56 (66-84)[1]	71 (72)	69 (70)	85 (100)	60 (75)
Julie Apartments	65 (67-98)[1]	65 (71-88)[1]	78 (81)	75 (76)	85 (100)	60 (75)
Larned Apartments	70 (74-101)[1]	56 (66-84)[1]	**89**[2] (93)	87 (**93**[3,5])	85 (100)	60 (75)
Westlake Hotel	70 (74-101)[1]	56 (66-84)[1]	**86**[2] (90)	83 (**90**[3])	85 (100)	60 (75)

[1]*Extrapolated from measured ambient levels at the nearest property.*
[2]*Sound levels without mitigation exceed City of Seattle daytime noise limits.*
[3]*Sound levels without mitigation exceed proposed Variance Noise Limits.*
[4]*Monitored on weekdays only.*
[5]*Vacuum Truck exceeds limit for sources with pure-tone component (80 dBA).*

TABLE 4-14
CALCULATED SOUND LEVELS, HOURLY Leq (Lmax), dBA
DENNY NETWORK PHASE 2
TASK 2 – EXCAVATION, DUCT-BANK INSTALLATION

Receiver Property	Existing Ambient		Calculated		SMC Noise Limit	
	Day	Late Night	Day	Night	Day	Night
Cosmopolitan Condo	65 (67-98)	65 (71-88)	82 (84)	82 (84)	85 (100)	60 (75)
Via[6] Apartments	70 (74-101)	56 (66-84)	**89**[2] (90)	89 (**90**[3])	85 (100)	60 (75)
Balfour Apartments	65 (71-101)[1]	62 (66-97)[1]	83 (84)	83 (84)	85 (100)	60 (75)
Williamsburg Apts.	69 (75-104)[1]	66 (70-97)[1]	82 (83)	82 (83)	85 (100)	60 (75)
Aspira Apts.	69 (75-104)	66 (70-97)	81 (84)	81 (84)	85 (100)	60 (75)
Harbor House	65 (71-101)	62 (66-97)	83 (84)	83 (84)	85 (100)	60 (75)
Stewart Court	64 (73-98)	59 (69-95)	79 (80)	78 (80)	85 (100)	60 (75)
Hotel Max	64 (73-98)[1]	59 (69-95)[1]	80 (82)	80 (82)	85 (100)	60 (75)
Metropolitan Towers[4]	70 (74-97)	59 (68-83)	78 (79)	77 (78)	85 (100)	60 (75)
Westin Hotel North Tower	70 (74-101)[1]	56 (66-84)[1]	76 (77)	76 (77)	85 (100)	60 (75)
Westin Hotel South Tower	70 (74-101)[1]	56 (66-84)[1]	70 (71)	69 (70)	85 (100)	60 (75)
Julie Apartments	65 (67-98)[1]	65 (71-88)[1]	77 (78)	77 (78)	85 (100)	60 (75)
Larned Apartments	70 (74-101)[1]	56 (66-84)[1]	**88**[2] (89)	87 (**88**[3])	85 (100)	60 (75)
Westlake Hotel	70 (74-101)[1]	56 (66-84)[1]	85 (89)	85 (**89**[3])	85 (100)	60 (75)

[1]*Extrapolated from measured ambient levels at the nearest property.*
[2]*Sound levels without mitigation exceed City of Seattle daytime noise limits.*
[3]*Sound levels without mitigation exceed proposed Variance Noise Limits.*
[4]*Monitored on weekdays only*

TABLE 4-15
CALCULATED SOUND LEVELS, HOURLY Leq (Lmax), dBA
DENNY NETWORK PHASE 2
TASK 3 – SURFACE RESTORATION

Receiver Property	Existing Ambient		Calculated		SMC Noise Limit	
	Day	Late Night	Day	Night	Day	Night
Cosmopolitan Condo	65 (67-98)	65 (71-88)	81 (84)	81 (84)	85 (100)	60 (75)
Via[6] Apartments	70 (74-101)	56 (66-84)	85 (87)	85 (**87**[3])	85 (100)	60 (75)
Balfour Apartments	65 (71-101)[1]	62 (66-97)[1]	83 (84)	83 (84)	85 (100)	60 (75)
Williamsburg Apts.	69 (75-104)[1]	66 (70-97)[1]	82 (86)	82 (**86**[3])	85 (100)	60 (75)
Aspira Apartments	69 (75-104)	66 (70-97)	80 (84)	80 (84)	85 (100)	60 (75)
Harbor House	65 (71-101)	62 (66-97)	83 (84)	83 (84)	85 (100)	60 (75)
Stewart Court	64 (73-98)	59 (69-95)	77 (78)	77 (78)	85 (100)	60 (75)
Hotel Max	64 (73-98)[1]	59 (69-95)[1]	77 (78)	77 (78)	85 (100)	60 (75)
Metropolitan Towers[4]	70 (74-97)	59 (68-83)	78 (79)	78 (79)	85 (100)	60 (75)
Westin Hotel North Tower	70 (74-101)[1]	56 (66-84)[1]	76 (77)	76 (77)	85 (100)	60 (75)
Westin Hotel South Tower	70 (74-101)[1]	56 (66-84)[1]	70 (71)	70 (71)	85 (100)	60 (75)
Julie Apartments	65 (67-98)[1]	65 (71-88)[1]	76 (77)	76 (77)	85 (100)	60 (75)
Larned Apartments	70 (74-101) [1]	56 (66-84) [1]	85 (90)	85 (**90**[3])	85 (100)	60 (75)
Westlake Hotel	70 (74-101) [1]	56 (66-84) [1]	82 (87)	82 (**87**[3])	85 (100)	60 (75)

[1]*Extrapolated from measured ambient levels at the nearest property.*
[2]*Sound levels without mitigation exceed City of Seattle daytime noise limits.*
[3]*Sound levels without mitigation exceed proposed Variance Noise Limits.*
[4]*Monitored on weekdays only*

The calculated sound levels from most construction activities exceed the City of Seattle nighttime noise limits. In the worst case of equipment located in the immediate vicinity of the Via[6], Williamsburg, and Larned Apartments and the Westlake Hotel, the exceedances are up to 29 dBA (Leq) and 18 dBA (Lmax) without mitigation. The noise sources primarily responsible for the nighttime Lmax exceedances are the concrete saw cutter in Task 1, excavator, mixer, and crane in Task 2, and concrete mixer and roller in Task 3, when located within 30 feet of affected buildings. Noise mitigation measures are listed in Section 4.2.

4.1.4 Exterior Sound Level Limits Proposed for the Variance

The proposed Noise Variance limits are expressed as hourly Lmax. The proposed criteria for Noise Monitoring and Compliance Tracking, presented in Sections 5.0 and 6.0, apply the proposed noise-limit values to the measured hourly L1. The rationale for selecting the descriptors for the Variance Application is explained in detail in the project NMMP prepared by BRC Acoustics.

Table 4-16 shows the proposed limits on the Lmax from nighttime construction activities within the scope of the MPPCNV. The table also shows the range of existing Lmax sound levels measured in the project areas, and nighttime noise limits applicable to the hourly Lmax in the absence of a MPPCNV.

TABLE 4-16
PROPOSED NIGHTTIME VARIANCE SOUND-LEVEL LIMITS
Lmax, *Fast* (dBA)

Project	Existing Baseline Late-Night	City of Seattle Nighttime Noise Limits	Proposed Variance Noise Limits
Substation	66-93	75	85
Denny Network Phase 1	59-79	75	85
Denny Network Phase 2	66-88	75	85

The proposed limits fall within the range of Lmax sound levels measured during the quietest hours of midnight to 5 a.m. in the Substation and Denny Network Phase-2 areas, and exceed the sound levels during the quietest hours by up to 6 dBA in the Denny Network Phase-1 area.

The sound-level limits shown in Table 4-16 apply at the nearest affected property lines or the worst-case façade point of affected buildings, whichever *sound level* is greater. During several construction scenarios, the point of compliance may be closer than 50 feet to the nearest construction noise source.

The Variance noise limits presented in Table 4-16 are proposed for non-impact construction equipment only. The permitted exceedances for impact-type equipment listed in Section 4.1.1 of this Application (SMC 25.08.425) pertain to the hours of 8 a.m. to 5 p.m. on weekdays and 9 a.m. to 5 p.m. on weekends. No nighttime use of impact-type equipment is proposed for construction of the Denny Substation Program. Furthermore, the provisions of the MPPCNV do not apply to daytime activities, which are expected to meet City of Seattle daytime noise limits with the mitigation measures described in Section 4.2.

However, on previous Major Public Projects covered by noise variances, DPD extended the allowable hours for impact-type equipment to 7 a.m. to 10 p.m. on weekdays and 9 a.m. to 10 p.m. on weekends and beginning at 7 a.m. on weekdays, in the interest of reducing the number of days when impact equipment must be used. The noise-mitigation measures pertaining to impact noise in Section 4.2 of this Plan were written under the assumption that impact-type equipment would be allowed on the project between 5 and 10 p.m., subject to the provisions of SMC 25.08.425C.

The calculated nighttime Lmax sound levels for the Substation Project, shown in Tables 4-6 to 4-9, are below the Variance noise limit to 85 dBA in most cases. Exceptions occur during shoring of the electrical vault in the alley immediately east of the site, near the Coldwell Apartments, during Street Utility Relocation and Asphalt Paving activities near the Alley 24 South Tower, SCCA Building, and Mirabella, and during Street Utility Relocation near the Brewster Apartments. The primary sources of the nighttime exceedances are concrete saw-cutter, milling-machine, dump-truck, and concrete-mixer operations when equipment is located within 25 feet of nearby buildings. During these instances, the Lmax at the lower floors of the affected buildings is expected to exceed the Variance noise limits by up to 6 dBA in the absence of noise mitigation. Noise mitigation measures for these scenarios are listed in Section 4.2 and consist of maintaining minimum distances to noise-sensitive receivers or using portable noise barriers, as well as broadband back-up alarms and critical-grade engine mufflers. It is expected that, with mitigation, the Lmax will be in compliance with the Variance noise limits.

Calculated exterior Lmax sound levels from nighttime construction activities on the Denny Network Phase-1 Project (Tables 4-10 to 4-12) generally meet the proposed Variance noise limit of 85 dBA, with the exception of sound levels at Alcyone and AMLI Apartments during Task 1 and at Casa Pacifica, Lakeview, and Stack House Apartments during all three Tasks. The noise sources primarily responsible for the nighttime Lmax exceedances are the concrete saw cutter and milling machine in Task 1, crane, dump trucks, mixer, and excavator in Task 2, and dump truck, roller, paver, and concrete mixer in Task 3, when located within 25 feet of affected buildings. During these instances, the Lmax at the lower floors of the affected buildings is expected to exceed the Variance noise limits by up to 6 dBA in the absence of noise mitigation. Vacuum trucks are expected to exceed the noise limit for sources with a pure-tone component (80 dBA) when located within 25 feet of affected buildings. The highest sound levels are expected at the first- to third-story windows of the apartment buildings. Noise-mitigation measures for these construction scenarios are proposed in Section 4.2 and consist of maintaining minimum distances to noise-sensitive receivers or using portable noise barriers, as well as broadband back-up alarms and critical-grade engine mufflers.

Calculated exterior Lmax sound levels from nighttime construction activities in the Denny Network Phase-2 Project (Tables 4-13 to 4-15) generally meet the proposed Variance noise limit of 85 dBA, with the exception of Williamsburg Apartments during Task 3 and Via[6] and Larned Apartments and the Westlake Hotel during all three Tasks. The noise sources primarily

responsible for the nighttime Lmax exceedances are the concrete saw cutter in Task 1, excavator, mixer, and crane in Task 2, and concrete mixer and roller in Task 3, when located within 30 feet of affected buildings. Vacuum trucks are expected to exceed the noise limit for sources with a pure-tone component (80 dBA) when located within 40 feet of affected buildings. The highest sound levels are expected at the first- to third-story windows of the apartment buildings. Noise-mitigation measures for these construction scenarios are proposed in Section 4.2 and consist of maintaining minimum distances to noise-sensitive receivers or using portable noise barriers, as well as broadband back-up alarms and critical-grade engine mufflers.

The building-exposure results presented in Tables 4-6 to 4-15 are at the worst-case points of building façades for each of the buildings near construction activities.

4.2 SMC 25.08.590 D.2 and 25.08.590 D.3 further require that the Noise Management and Mitigation Plan include

D.2 Measures and provisions to be taken to avoid exceeding the exterior sound level limits of SMC Chapter 25.08; and

D.3 Provisions to mitigate sounds that exceed the exterior sound level limits and that cannot otherwise be avoided.

The following noise mitigation measures will be included in Section 1-07.5(5) of the project Bid Documents:

- The Contractor shall take all reasonable measures for the suppression of noise resulting from work operations, mobile engine-driven cranes, excavators, and similar material-handling equipment.

- Impact tools such as hoe rams and jackhammers can be used during the hours of 8 a.m. to 10 p.m. on weekdays and 9 a.m. to 10 p.m. on weekends and Holidays, subject to the limits of SMC 25.08.425. The practice of shaking the auger drill bit to remove stuck-on debris also falls into this category of impact tools.

- The Contractor shall notify Seattle City Light's community-outreach staff 10 days in advance of initiating new phases of construction work that will generate noise at high levels and prior to work that will occur during nighttime hours when a noise variance is in effect.

The following measures apply to nighttime construction work:

- All trucks performing export hauls between the hours of 10 p.m. and 7 a.m. Monday through Friday and 10 p.m. to 9 a.m. on Saturday and Sunday shall maintain a one-

foot layer of soil in the truck bed upon return, in order to mitigate the sound of material impacting the empty metal truck bed.

- All backup warning devices shall be the broadband type, or the Contractor may use a backup observer in lieu of backup warning devices as allowed by WAC 96-155-610 (2)(e).

- Compression brakes shall not be used on site.

- Equipment shall not idle unused for longer than 5 minutes.

- Diesel engines operating between the hours of 10 p.m. and 7 a.m. Monday through Friday and 10 p.m. to 9 a.m. on Saturday and Sunday shall be equipped with exhaust and air-intake silencers designated for the maximum degree of silencing. The type of silencer required is that for use in critical noise problem locations such as high-density residential, hotel, and hospital areas.

- Lighting and other stationary equipment such as generators, air compressors, or any other similar equipment used for nighttime work shall be directed away from residences, and shall be shielded.

- Generators and compressors can be used between the hours of 10 p.m. and 7 a.m. Monday through Friday and between the hours of 10 p.m. and 9 a.m. Saturday and Sunday, provided approved mitigation shields are used during these hours of work.

- Radios shall be used for all long-range communication during the contract.

- Exercise care in lowering and placing steel plates, steel shoring piles, and other large steel objects onto the pavement. Avoid dropping objects onto hard surfaces.

- Any material or debris that spills on the pavement shall be removed by hand or by sweeping. The contractor shall employ no scraping-type equipment or activity to clean pavement surfaces.

- Moveable local noise barriers will be required to mitigate noise levels from some equipment operating within 30 or 40 feet of sensitive receivers (residential uses in commercial zones) during nighttime work and some daytime work in commercial areas to meet interior noise-level requirements for commercial districts set forth in SMC 25.08.425C. The specific situations in which barriers are required are listed in Table 4-17.

Table 4-17 lists equipment-specific noise mitigation proposed in order to meet City of Seattle daytime noise limits and the nighttime Noise Variance limits proposed in Section 4.1.4.

TABLE 4-17
PROPOSED NOISE MITIGATION FOR SPECIFIC EQUIPMENT

Equipment	Daytime Mitigation	Nighttime Mitigation
Hoe ram	Remain at least 30 feet from residential or commercial buildings, or	No use of impact-type equipment at night
	use 12' high portable barrier	
Auger drill		Avoid shaking the drill bit, causing impact-type noise
Concrete saw cutter	Remain at least 30 feet from residential or commercial buildings, or	Remain at least 30 feet from residential or commercial buildings, or
	use 6' high portable barrier	use 6' high portable barrier
Excavator, concrete mixer, roller, milling machine, paver, crane	Remain at least 25 feet from residential or commercial buildings, or	Remain at least 30 feet from residential or commercial buildings, or
	use 12' high portable barrier	use 12' high portable barrier
		Broadband backup warning or observed backup
		Critical-grade mufflers
Vacuum Truck	Remain at least 30 feet from residential or commercial buildings, or	Remain at least 40 feet from residential or commercial buildings, or
	use 12' high portable barrier	use 12' high portable barrier
Dump Truck		1-foot layer of soil in truck bed upon (otherwise empty) return
		Broadband backup warning or observed backup
		Critical-grade mufflers

Portable sound barriers may consist of a 3/4-inch thick layer of plywood or equivalent solid material weighing a minimum of 2-1/2 pounds per square foot. The minimum height of the barrier should be as indicated in Table 4-17.

The portable barriers shall surround the equipment on three sides, with the opening oriented away from noise-sensitive receivers. The barrier shall be located as close to the equipment as practically possible.

For equipment that has exposure to noise-sensitive receivers in more than one direction, it may be necessary to treat the barrier surface facing the equipment with a sound-absorptive material.

As an example, the barrier surfaces may be covered with two-inch thick weather-protected glass fiber panels such as Model S4 by Kinetics or equivalent.

4.3 SMC 25.08.590 D.4 requires that the Noise Management and Mitigation Plan include

A process for informing the public in the affected areas about the provisions of the variance.

During the entire construction period of the Denny Substation and Denny Network Phase 1 and Phase 2, Seattle City Light (SCL) will provide the community with up-to-date information about planned construction activities and will respond to all public inquiries received (including noise complaints). Specifically, outreach staff will work in close coordination with the Contractor to ensure that the public is kept aware of any nighttime work that may result in noisy conditions, and that all complaints are dealt with in a timely and effective manner.

SCL will implement an extensive public process to inform the public about provisions of the noise variance and activities it covers, and about all planned construction activities. Additionally, SCL will respond quickly to complaints about noise and other construction issues. The Community Outreach programs listed below will be in place prior to commencement of work.

Building the networks in the public right-of-way can temporarily impact neighborhood residents and businesses. SCL's experience has shown that advance notification of an activity can greatly reduce the perceived impact of construction. SCL's community outreach and public involvement program, described below, will continue throughout the construction period. Periodic public meetings, construction update flyers distributed in the project area, and updates to the web page will be used to inform the public about the progress of construction. Staff will also visit adjacent businesses and homes to discuss construction activity.

Seattle City Light has developed and implemented a proactive program of notification and communication. This will continue through the entire construction process with the goal of keeping the public informed of construction activities through a variety of methods, including:

1) Written materials

a) Fact sheets will contain information on construction activities, what to expect, potential impacts, ways to stay informed, etc. The fact sheets will be printed and handed out at public meetings and to residents and businesses in the project area.

b) Frequently asked questions (FAQ) will answer typical questions related to construction. The FAQ will be updated frequently and will be made available in print and on the project website.

c) Construction alerts will provide fast breaking information on specific activities, such as road closure, night work, utility shut-offs, etc. Construction alerts are e-mailed or printed and hand-delivered as needed.

d) Custom written materials (door hangers, newsletters, etc.) will have the look and feel of existing stakeholder publications. They will be produced as needed.

e) Traffic advisories will provide information to the media about upcoming street closures and will include descriptions of posted detours.

f) News releases will describe major construction milestones as well as construction activities that will have significant impacts.

2) Electronic methods

a) The Denny Substation website (www.seattle.gov/light/dennysub) will be kept up to date with the latest construction information. It will include up-to-date schedules, information about specific activities, graphics and photos depicting activities, and ways to stay informed.

b) The Denny Substation Social media program (Facebook, Twitter, and Instagram) will be used to convey up-to-the-minute information about specific construction activities in specific locations. This will include night work, lane closure information, and work that is expected to be noisy.

c) The Denny Substation Project Hotline ((206) 257-2142) will be used to provide brief construction updates that callers can listen to. Callers can also leave a message with a question, comment or complaint. The hotline will be monitored 24 hours a day.

3) In person methods

a) Host public meetings and provide opportunities for the public to meet with staff to discuss their concerns and to receive information about the proposed project.
b) Conduct Community Forums to inform stakeholders about construction activities and potential impacts.
c) Conduct a door-to-door pre-construction survey to provide information about construction and to collect information about access needs, sensitive receptors, etc.
d) Hold neighborhood construction update meetings to provide the public with opportunities to speak directly with the project staff and the Contractor about current concerns, etc.
e) Conduct community group briefings with businesses and other organizations.
f) Participate in community events such as fairs and festivals.
g) Provide viewing portals into the construction site and look for other opportunities for people to view the construction site.
h) Conduct ongoing door-to-door outreach to properties directly impacted by construction activities.

Community outreach protocols for advance notification of noise-producing activities:

a) The Contractor will notify Seattle City Light's community-outreach staff 10 days in advance of initiating new phases of construction work that will generate noise at high levels and prior to work that will occur during nighttime hours when a noise variance is in effect.

b) SCL's community outreach staff will notify nearby residents and businesses 5 days prior to the noisemaking activities. Notification will normally include an e-mail alert to the project e-mail list, hand distribution of a Construction Alert flyer to affected parties, social-media postings, and an outgoing hotline message. All notifications will contain the name and contact information for the SCL community-outreach staff person assigned to the particular project area and the Construction Hotline number. They also will contain the URL for the Seattle City Light web page for the Denny Substation Project, where people can sign up for regular e-mail newsletters and Construction Alert notifications.

c) Business and residential neighbors can contact the Seattle City Light community-outreach staff by telephone or e-mail to inquire about construction issues or to register complaints about noise or other matters.

Community outreach protocols during the construction period:

When construction activities reach the level where they start to create a perceived impact, Seattle City Light's community-outreach staff members will be available 24 hours a day to work on solutions. Regular visits with impacted residents and businesses are a key component in identifying problems before they become complaints. As an integral part of the construction management team, outreach staff will work in the field along with the inspectors and the Resident Engineer to help avoid construction impacts. The outreach staff will

a) Monitor the Contractor's activities to minimize impacts
   i) Traffic flow
   ii) Pedestrian traffic
   iii) Access to business and residential properties
   iv) Housekeeping / worksite maintenance
   v) Parking
   vi) Directional signage

b) Work cooperatively to solve problems, minimize impacts and respond to concerns or complaints:
   i) Door to door outreach to impacted properties
   ii) Utilize the hotline to receive concerns / complaints
   iii) Provide "businesses are open" signage to mitigate construction impacts.

5.0 CONTRACTOR REQUIREMENTS

In order to satisfy the requirements of SMC 25.08.655 and Director's Rule 3-2009, the project Bid Documents will include Section 1-07.5(5), *Noise Pollution*. In addition to the mitigation measures discussed in Section 4.2 above, Section 1-07.5(5) will outline specifications for a Noise Control and Monitoring Plan (NCMP) to be prepared by the Contractor and submitted to Seattle City Light. The NCMP will be prepared by an Acoustical Specialist retained by the Contractor, and will be submitted to Seattle City Light not less than 4 weeks prior to the scheduled commencement of any nighttime work under the Major Public Project Construction Noise Variance.

The minimum qualifications of the Acoustical Specialist shall include

- Five or more years of experience in the field of construction-noise analysis and control;
- Membership in the National Council of Acoustical Consultants (NCAC), Institute of Noise Control Engineering (INCE), or Acoustical Society of America (ASA).

The Contractor's NCMP for each of the three Projects of the Denny Substation Program shall contain, as a minimum:

- A description of project construction activities under the Variance, including construction tasks, equipment to be used, proposed equipment locations and noise emissions, and proposed hours of construction;

- A listing of noise-sensitive properties potentially affected by construction noise, including zoning and location relative to proposed construction activities;

- Noise limits pertaining to construction activities under the Variance, as approved by DPD in the Decision on the Variance;

- Calculations of sound levels to be expected at noise-sensitive receivers during construction activities proposed under the Variance and an evaluation of the sound levels with respect to noise limits established under the Variance;

- Noise mitigation measures mandated by the Decision on the Variance and by the Contract Documents;

- Additional noise mitigation measures specific to the Contractor's selected construction methods and identified as necessary to comply with the conditions of the Variance Decision.

After the Contractor's NCMP is approved by Seattle City Light, it shall be submitted to the City of Seattle DPD for approval prior to the commencement of nighttime work under the Variance.

A copy of the approved NCMP shall be maintained in the Contractor's office, and its contents communicated to all employees and subcontractors conducting nighttime work under the Variance.

6.0 NOISE VARIANCE COMPLIANCE TRACKING

6.1 Independent Noise Monitor

Director's Rule 3-2009, Section C.2, requires that Seattle City Light provide an Independent Noise Monitor (INM), *i.e.*, an individual, firm, or contracted staff member within DPD, whose responsibility is to oversee the monitoring of sound levels from construction covered by the MPPCNV and to report directly to the DPD Coordinator for Noise Abatement.

6.2 Sound-Level Monitoring

The collection of sound levels will be effected with Noise-Monitoring Terminals with the capability to log continuous sound levels and to initiate a recording of audio files when a sound-level threshold is exceeded. For the Substation Project, the location of the Noise-Monitoring Terminals would be fixed for the duration of the project. For the Denny Network Projects, the location of the Noise Monitoring Terminals will follow the progress of construction activities along the duct-bank areas.

The responsibility of the Contractor will be to provide, install, and maintain the instrumentation that is part of the Noise-Monitoring Terminals (overseen by the INM) and to provide unrestricted physical and electronic access to the monitoring data for the INM. Continuous, overnight monitoring using the Noise-Monitoring Terminals is to commence at the start of work (or mobilization) on nighttime construction tasks covered by the Variance. The sound descriptors to be monitored are the Leq and L1. The Contractor is tasked with reviewing the monitoring data on a daily basis and compiling weekly data reports.

The Noise-Monitoring Terminals will include the following instrumentation:

- One sound-level meter with the following specifications and capabilities:
  - Type 1 rating per ANSI S1.4 and 1.43;
  - Continuous, A-weighted logging of one-second Leq;
  - Reporting of L1 at intervals of 15 minutes and one hour;
  - Capability to record sound files based on a threshold pertaining to the *Fast* time-weighted sound level;
  - Capability to analyze sound spectra as part of post-processing on recorded sound files;
  - Sufficient internal memory and power supply for one week of logging, including sound recordings;

- Weekly field calibrations;
- Annual calibration at a National Voluntary Laboratory Accreditation Program (NVLAP)-accredited acoustical laboratory.

- One random-incidence microphone housed in an environmental shroud, providing protection from rain and wind conditions.

- One lockable and weather-resistant enclosure large enough to accommodate the battery, sound level meter, and accessories.

Unrestricted physical access and restricted electronic access (viewing only) will be provided to Seattle City Light, the DPD Coordinator for Noise Abatement, and the Contractor. The INM is responsible for maintaining the collected data on the Noise-monitoring Terminals, including downloading the previous night's data, and reviewing the sound levels for compliance with applicable Variance sound-level limits.

Depending on access to receiving properties, noise monitoring locations should be selected from the list of baseline sound-monitoring locations indicated in Section 2.1 of this Application.

6.3 Complaint Response

The INM should remain on-call during all periods of scheduled night work, as identified by the Resident Engineer. Noise-related complaints received by Seattle City Light's 24-hour construction hotline will be forwarded to the INM during nighttime construction hours. If the INM receives a complaint call during nighttime work hours, the INM will notify the Resident Engineer, perform a site inspection within 60 minutes of receiving the complaint, and conduct short-term noise measurements (minimum 15 minutes per location) while on-site to confirm whether an exceedance of the Variance sound-level limits is occurring.

6.4 Noise Variance Non-Compliance Resolution

In the case of prolonged or repeated instances of non-compliance, the INM will coordinate with the DPD Coordinator for Noise Abatement, Seattle City Light, and the Contractor, as directed by DPD. The Contractor may be required to provide additional noise mitigation measures, such as those listed in Section 4.2 of this Application, to resolve non-compliance issues.

6.5 Compliance Monitoring

As required by DR 3-2009, the INM will provide the following reports:

- Weekly reports provided to DPD and Seattle City Light no later than Wednesday following the completion of the reported week, whether or not night work occurred.

- Summarize sound-level measurements and data collected during the reporting period;
- Mitigation measures employed during the reporting period;
- Observations of activities not conforming with Variance conditions during the reporting period, and any corrective actions taken;
- Complaints received during the reporting period, and any corrective actions taken.

- Annual reports, provided to DPD and Seattle City Light no later than one week following the completion of the reported year. The first annual report will be used by DPD during the one-year check-in-review mandated by DR 3-2009 Section H.
  - General summary of performance under the Variance;
  - Summary of weekly reports, including any exceendances of the Variance sound-level limits, complaints received, and corrective action taken.

- Final report, provided to DPD and Seattle City Light at the end of the Project.
  - General summary of performance under the Variance;
  - Summary of annual reports, including limits exceedances, complaints received, and corrective action taken.